

**CHITTAGONG INDEPENDENT UNIVERSITY**  
**SCHOOL OF ENGINEERING AND COMPUTER SCIENCE**

**Curriculum for**  
**Post Graduate Diploma in Information and Communication Technology**  
**(PGDICT)**

**Course Name: PGDICT**

**Course Duration: 1 Year**

**Course Description:**

In order to obtain a Post Graduate Diploma in Information and Communication Technology a student must complete 36 credits which contains 30 credits of course work and a project work of 6 credits.

**Entry Requirement:**

- I) At least a 4- year Bachelor Degree in any discipline with mathematics in HSC or equivalent level.
- II) At least a 3- year Bachelor Degree in any discipline plus one year professional experience in ICT sector with mathematics in HSC or equivalent level.
- III) Must not have a GPA less than 2.00 out of 5.00 or a third division or equivalent in any of the public examinations.

**Course Structure and Outline**

**Summary of the Courses:**

<b>Sl. No.</b>	<b>Course No.</b>	<b>Course Title</b>	<b>Credit (Theory + Lab.)</b>	<b>Hours/Week (Theory + Lab.)</b>
<b>1</b>	<b>ICT 500</b>	<b>Project for PGDICT</b>	<b>0+6=6</b>	<b>0+6</b>
<b>2</b>	<b>ICT 501</b>	<b>Fundamentals of Computing</b>	<b>2+1=3</b>	<b>2+2</b>
<b>3</b>	<b>ICT 502</b>	<b>Introduction to Programming Concepts</b>	<b>2+1=3</b>	<b>2+2</b>
<b>4</b>	<b>ICT 503</b>	<b>Data Structures and Algorithms</b>	<b>2+1=3</b>	<b>2+2</b>
<b>5</b>	<b>ICT 504</b>	<b>Digital Logic Design</b>	<b>2+1=3</b>	<b>2+2</b>
<b>6</b>	<b>ICT 505</b>	<b>Database Management Systems</b>	<b>2+1=3</b>	<b>2+2</b>
<b>7</b>	<b>ICT 506</b>	<b>Operating Systems Fundamentals</b>	<b>2+1=3</b>	<b>2+2</b>

<b>8</b>	<b>ICT 507</b>	<b>Object Oriented Programming</b>	<b>2+1=3</b>	<b>2+2</b>
<b>9</b>	<b>ICT 508</b>	<b>Data Communications</b>	<b>2+1=3</b>	<b>2+2</b>
<b>10</b>	<b>ICT 5**</b>	<b>Optional I</b>	<b>3</b>	
<b>11</b>	<b>ICT 5**</b>	<b>Optional II</b>	<b>3</b>	

**Optional Courses will be offered from the following courses:**

<b>Sl. No.</b>	<b>Course No.</b>	<b>Course Title</b>	<b>Credit (Theory + Lab)</b>	<b>Hours/Week (Theory + Lab.)</b>
<b>1</b>	<b>ICT 509</b>	<b>Communication Technology</b>	<b>2+1=3</b>	<b>2+2</b>
<b>2</b>	<b>ICT 510</b>	<b>Multimedia Design and Developments</b>	<b>2+1=3</b>	<b>2+2</b>
<b>3</b>	<b>ICT 511</b>	<b>Computer Networks</b>	<b>2+1=3</b>	<b>2+2</b>
<b>4</b>	<b>ICT 512</b>	<b>Cloud Computing</b>	<b>3</b>	<b>3+0</b>
<b>5</b>	<b>ICT 513</b>	<b>Software Engineering</b>	<b>3</b>	<b>3+0</b>
<b>6</b>	<b>ICT 514</b>	<b>Network System Design</b>	<b>2+1=3</b>	<b>2+2</b>
<b>7</b>	<b>ICT 515</b>	<b>Advanced Internet Technologies</b>	<b>2+1=3</b>	<b>2+2</b>
<b>8</b>	<b>ICT 516</b>	<b>Big Data and Social Network</b>	<b>3</b>	<b>3+0</b>
<b>9</b>	<b>ICT 517</b>	<b>Network Management</b>	<b>2+1=3</b>	<b>2+2</b>
<b>10</b>	<b>ICT 518</b>	<b>Fundamentals of E- Commerce</b>	<b>3</b>	<b>3+0</b>
<b>11</b>	<b>ICT 519</b>	<b>Web Technologies</b>	<b>2+1=3</b>	<b>2+2</b>
<b>12</b>	<b>ICT 520</b>	<b>Real Time and Embedded Systems</b>	<b>3</b>	<b>3+0</b>
<b>13</b>	<b>ICT 521</b>	<b>System Analysis and Design</b>	<b>3</b>	<b>3+0</b>
<b>14</b>	<b>ICT 522</b>	<b>Software Quality Management</b>	<b>3</b>	<b>3+0</b>

## Outline of the Courses

### **ICT 500: Project for PGDICT (3 Credits)**

A student must independently complete a project (design and develop an application software or system) and submit a final report under the guidance of a supervisor.

### **ICT 501: Fundamentals of Computing**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Computer-History, types, Organization, Architecture, computer peripherals, Storage devices, Software & Hardware, Operating Systems, Hardware & Trouble Shooting etc. Word processing using MS-WORD, Spread-Sheet analysis using MS-EXCEL, MS- Power Point, MS- Visio for drawing etc.

### **ICT 502: Introduction to Programming**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Programming Concepts: Introduction to Programming, Algorithm and Flow Chart. Programming Paradigms: Types of Programming, Procedural Programming and Object Oriented Programming. Programming Language C/C++: Constants, Variables, Data Types, Operators, Expressions, Input and Output Operation, Branching, Looping, Array, Pointer, Function, Structure, Union, File Handling, Dynamic Memory Allocation.

### **ICT 503: Data Structures and Algorithms**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Elementary data structures: Arrays, Record, Linked Lists, Stacks, Queues, Trees. Techniques for analysis of algorithms: Basic search and traversal techniques, Sorting algorithms. Methods for the design of efficient algorithms: Recursion, Divide and conquer, Greedy method, Dynamic programming, Graph algorithms.

### **ICT 504: Digital Logic Design**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Introduction to Number Systems and Codes, Analysis and Synthesis of Digital Logic Circuits: Basic Logic Functions, Boolean Algebra, Mapping, Combinational Logic Design, Minimization of Combinational Logic, Multiplexer, Demultiplexer, Encoder, Decoder, Comparator, Binary Adders etc. Different Types of Sequential Circuits: Latches and Flip- Flops, Counter, Register etc. Different Types of Programmable Logic Devices and ALU Design.

### **ICT 505: Database Management Systems**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Database System Concepts: Introduction to Database, Data Models and ER Models, Functional dependencies, Normalization and Normal Forms, Relational Algebra and Calculus, relational

model, Database Design and implementations, Database Development using SQL Server. SQL: DDL, DML, DCL, Indexing. QueryDevelopment: Basic SELECT, Functions, Sub-queries and Joins, Procedural Language Extensions of SQL, Data Integrity, Transaction Concurrency Control and Recovery management.

### **ICT 506: Operating Systems Fundamentals**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Overview of operating system and its role in computer systems; Process: process model, inter-process communication; thread model; CPU scheduling; Memory management, virtual memory, address translation; File systems: files, directories, protection and security; Input, output; Deadlock; Introduction to UNIX, UNIX kernel, UNIX commands, services, device structure, memory structure, process and jobs, file system and file management, vi and emacs editors, shell programming; LINUX: user management, privilege, using rpm, using configuration files.

### **ICT 507: Object Oriented Programming**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Concepts of visual programming; Data types, variables and expressions, control structures; Classes and objects, constructors; Inheritance, packages and interfaces; Exception handling; Collection classes: array, vector; Threads; GUI development; applets; Graphics and multimedia; Servlet; JDBC; Java beans; Java server page; Java networking, different software development platforms.

### **ICT 508: Data Communications**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Introduction to data communication and networks; transmission media, signals, noises, modulation and demodulation, synchronous and asynchronous transmission, line encoding, error detection and correction, RS 232 interface, HDLC, flow control and error control; Channel multiplexing; Data network: point to point connections, circuit-switched, message switched and packed switched networks, WANs, ISPs and LANs, differences in ownership, speed and cost; Types of communication: client server communication, broadcast, unicast and multicast modes, simplex, duplex and half duplex information flow; Bandwidth: distribution of bandwidth, discrete bandwidth requirements, implications of other factors; Internet, OSI reference model, TCP/IP reference model, TCP/IP architecture

### **ICT 509: Communication Technology**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Overview of telecommunication: history, evolution, convergence of telecommunication and data networks, standards; Basics of communication systems: modulation, multiplexing; Switching system: circuit switching, packet switching; Voice over Internet Protocol (VoIP), Fax over IP network, voice over frame relay, and ATM; Telephony: operating principles, telephone

apparatus, description of the modern phone; Telephone switching systems: PBX, Centrex, ACDs, call centers, computer integration; Data communication equipment: introduction to terminals, modems, RS-232 and other interfaces, modem types; Tele-Traffic analysis; Cellular telephony: Frequency reuse, frequency management, channel alignment, handoffs strategies, FDMA, TDMA, CDMA and GSM, Introduction to satellite communication, Optical fiber communication, Submarine cables, Digital Radio Microwave, etc.

### **ICT 510: Multimedia Design and Developments**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Introduction to multimedia: image, sound, video formats and their different properties, compression, playing and recording techniques, conversions between different formats and their combinations. Multimedia authoring, HTML: Introduction to web and HTML, basic HTML tags Essentials for good design, Uploading Web pages to the Web Server, Cascading Style sheets, Dynamic HTML. Drawing: Basic image properties, How to set/change them in Photo Shop, Concepts of layers, colors, text, texture, brightness, contrast, filters and effects, Photo Shop Print production, Photo Shop Web Production, Introduction to Macromedia Director, Illustrator and Premier, Animation creating software (Media studio/ Video studio etc ), its use, facts to concern while marketing.

### **ICT 511: Computer Networks**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Overview of LAN concepts, media, collision and broadcast; MAC address; Token ring, Fiber Distributed Data Interface (FDDI), Ethernet and Carrier Sense Multiple Access Collision Detect (CSMA/CD), IEEE 802.3., LAN topology; Network layer: internetworking, routing, IPv4 and IPv6 addressing, subnetting, VLSM, NATPAT, ACL, ARP and RARP, DHCP, RIP, IGRP and EIGRP, OSPF; Upper layers of OSI model; Wireless LAN: Ad hoc, infrastructure networks; WAN services: analog dial-up, ISDN dial-up, dedicated leased line, X.25, frame relay, ATM; IEEE802.11: physical layer, framing, multiple access techniques, blue-tooth, IEEE 802.15; Broadband wireless: Wireless ATM, 802.16; local multipoint distribution service (LMDS), Multichannel, Multipoint Distribution System (MMDS); Network protocols: mobile IP, cellular IP, mobile Ad hoc networking.

### **ICT 512: Cloud Computing**

**(Theory: 3 Hours/Week, Credit: 3.0)**

Introduction of Cloud Computing, History of Cloud Computing, NIST Define, Cloud Computing Architecture ,Cloud as Green, Cloud as Smart, Open source – Apache VCL ,Open Source Cloud – Apache, Apache Hadoop, IBM 1350 System, Install VCL, Create Sandbox, Create Image Performance, Algorithm Standard Implement, Planet Lab, Sharing Resource Schemes, Fault Tolerant schemes, Other Related Schemes

### **ICT 513: Software Engineering**

**(Theory: 3 Hours/Week, Credit: 3.0)**

Introduction: Software Engineering paradigms, Different Software Design Methodologies, Requirement Engineering. Software Models: Different Software Complexity Models, Graphical Analysis of Complexity Measures, Memory Requirement Analysis, Processing Time Analysis, Testing Philosophy and Methods, Software Reliability and Availability. Quality Control and Measure: Quality Measure and Assurance, Software Maintenance, Development of an Application Using Software Engineering Concepts.

### **ICT 514: Network System Design**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

General design process, issues, documents. LAN design: Media, devices and tools; LAN topology, star and extended star, ring, bus; Physical layout, network map, cables and conduits, labeling; Firewall. Wireless LAN: Issues and motivations; standards, IEEE 802.11; Transmission techniques: Infrared, spread spectrum and narrow band microwave; Application areas: Extension, cross building interconnect, nomadic access, ad hoc networks; Equipment and devices. WAN design: Types and technologies; Equipment and devices; Structured design approach, considerations of design, selection and placement of devices; Evaluation of network performance, security, reliability, and management capabilities.

### **ICT 515: Advanced Internet Technologies**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Introduction to the Internet: Introduction to XML, XHTML, XSL, integrating JavaScript and XSL; Internet Address, sockets; Application specific protocols and services: authentication, domain name services (DNS), electronic mail, world wide web, web caching, network management, internet control message protocol (ICMP), file transfer protocol (FTP), secured remote access; Voice over IP and its protocols, Next generation of internet, Revolutionary application of internet.

### **ICT 516: Big Data and Social Network**

**(Theory: 3 Hours/Week, Credit: 3.0)**

Big Data Analytics: Data Analytics Algorithms, Mapreduce (Hadoop) programming, Social Network Analytics: Introduction to Social Networks and Social Network Sites, Social network analytics algorithms, Social event and trend modeling, Big Data Analytics for Social Network: Twitter streaming APIs for data collection, Distributed framework for social sentiment analysis, online social events analysis and monitoring.

### **ICT 517: Network Management**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Concepts: Network operating system, Streaming technology, Inter process communication (IPC) between application programs, Abstract Syntax Notation One (ASN.1), TELNET. Protocols concept: File Transfer Protocol (FTP), Simple mail transfer protocol (SMTP), Simple Network Management Protocol (SNMP), network programming, socket-level interface, algorithm and issues in client / server software design, Installation, Administration and management of commercial network software packages. Network services: Network information service (NIS) and network file system (NFS), State-of-the-art network management tools and systems, high speed LAN, MAN, network management and troubleshooting techniques.

### **ICT 518: Fundamentals of E- Commerce**

**(Theory: 3 Hours/Week, Credit: 3.0)**

Overview of electronic commerce, business models; E-commerce channels: portals, auctions, communities, marketplace; Managing the marketplace: Demographics and advertising; Customer relationship management, web services for B2B and B2C ecommerce, electronic payment systems; Network security, cryptography, digital certificates; Markup for e-commerce: ebXML, M-commerce, L-commerce, wireless and U-commerce, digital money and electronic banking; Ethical, legal, and regulatory environment: Intellectual property, copyright, trademark, patents.

### **ICT 519: Web Technologies**

**(Theory: 2 Hours/Week, Lab: 2 Hours/Week, Credit: 3.0)**

Introduction to Web Programming: Concepts of Web Programming, Data Types, Variables and Expressions, Control structures, Classes and Objects, Constructors, Inheritance, Interfaces, Exception Handling. CollectionClasses: Array, Threads. GUI development: Forms, Building Web pages, Server Controls, Data Access, Security, Client-Side Programming, Server side development technologies such as ASP.net, PHP, Perl, Java Servlets, JSP and JSP.net.

### **ICT 520: Real Time and Embedded Systems**

**(Theory: 3 Hours/Week, Credit: 3.0)**

Introduction: Concepts, Classifications, Characteristics, Requirements, Introduction to embedded system design process, Unified Modeling Language (UML), Embedded micro-controller cores, Embedded memories, Technological aspects, Interfacing between analog and digital blocks, Signal conditioning, Digital signal processing, sub-system interfacing, Interfacing with external systems, user interfacing, Design trade-offs, Thermal considerations. Networked embedded systems: The I2C bus, the CAN bus, the Flex Ray, Example of applications.

**ICT 521: System Analysis and Design****(Theory: 3 Hours/Week, Credit: 3.0)**

Different types of information systems, attributes of information, roles, tasks and attributes of a system analyst, sources of information, information gathering techniques, handling of missing information, steps of system analysis, different types of feasibility analysis; Design of an information system: process modeling, logic and timing modeling, conceptual data modeling; Project effort analysis method, designing user interfaces, database and file design, project team organization, project management and documentation, system installation and commissioning, analysis of system maintenance and upgrading; Ethics, privacy control and security; Case study of an information system.

**ICT 522: Software Quality Management****(Theory: 3 Hours/Week, Credit: 3.0)**

Software quality, software process and process metrics, different quality metrics of software; Verification and validation tasks and techniques, software error and defect removal, SQA management and models, statistical quality control; Quality management system: ISO 9000, ISO9001, and IEEE 12207 Standards; Compliance criteria of different standards: 9000/AS-3563 and ISO 9001, Capability Maturity Model (CMM), People Capability Maturity Model (P-CMM); Benchmarking and certification.